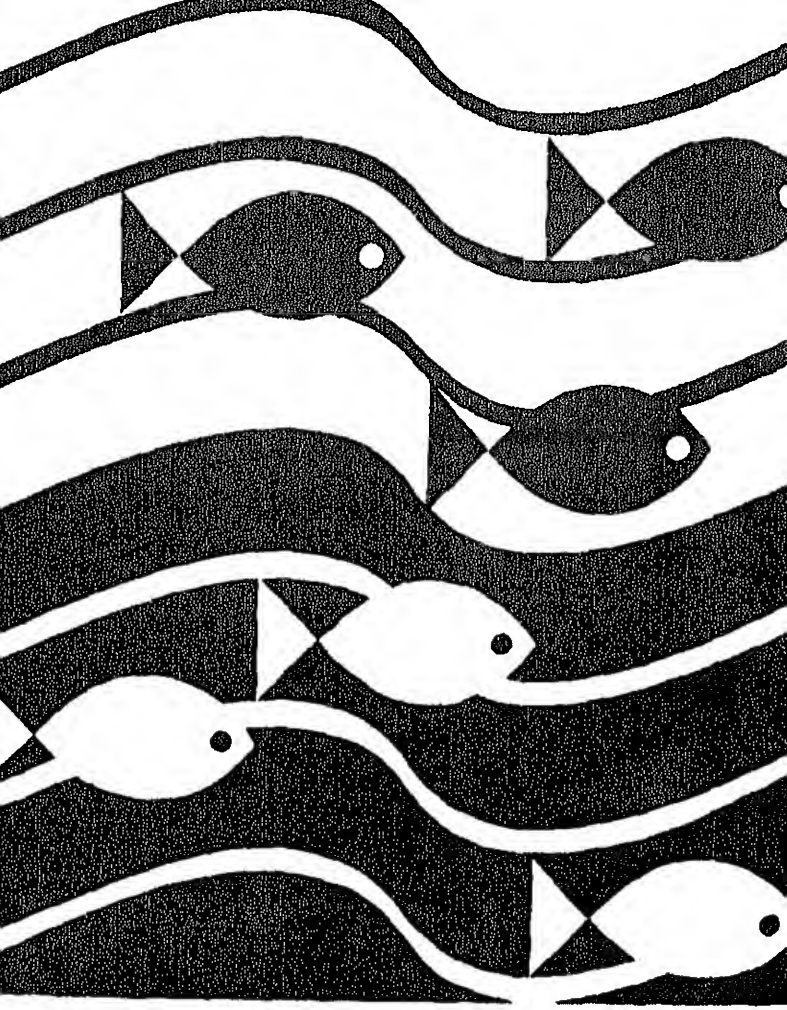

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juvenile salmonid fishes were studied in Porcupine Creek, a small c
eam in an old-growth forest in southeast Alaska During summer, coho
*corhunchus kisutch*) were distributed in both stream/estuary ecoto
shwater reaches, and biomass (g per $m^2$) was directly related to tota
ime. Trout (*Salmo gairdneri* and *S. clarki*) and Dolly Varden
*lvelinus malma*) were not common in the stream/ estuary ecotone bu
mon in freshwater. Total salmonid biomass during summer was di
ated to the amount of large organic debris in the stream. Tagged sal
ved little movement during summer but redistributed themselves with
cupine Creek system before winter Coho moved out of the stream/e
tone to upstream freshwater areas to overwinter. In late autumn, coh
marily large mainstream pools, backwater pools, and secondary-c
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Germany! During the German Antarctic expeditions of 1979-1980 and
plankton and fish fry were collected quantitatively in the easte
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300 or 500 μ nylon gauze; they carried digital flow-meters and time-
rders The 1979-80 cruise yielded more than 28,000 fish larvae in 102
per haul), and 939 larvae were caught in 55 hauls (17 per haul) in 19
than 95% of the fish larvae belonged to *Pleuragramma antarcticum*. M
ities of 774 larvae $m^2$ and 59 larvae $m^2$ were found in 1979-80 and 1
ectively. Length of age-group 0 fish ranged from 8-16 mm in January o
s, and age-group 1 fish were 25-47 mm at the same time By the e
nary, lengths of age-group 0 fish were 18-22 mm Larval growth
*rcticum* during the 6-week observation period was 0.24 mm $d^{-1}$ for
p fish These larvae were concentrated in the 25-50 m water layer. C
elative eye-size, from 5 5% in 12 mm larvae to > 8% in adults, are r
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$20 00 from J W Reintjes, Rt 4, Box 85, Morehead Cit
[NMFS, Auke Bay, AK] The seaward migration of coh
return of adults were monitored at Porcupine Creek f
captured in 1978 and 1979 were tagged with coded-wire
survival The number of coho salmon smolts produced
watershed based on the ratio of tagged-to-untagged ret
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was estimated to be 0 3/m$^2$ and 0 26/m$^2$ for 1978 and 1
was substantial annual variation in smolt size and ag
781 and 373 adult coho, including fish that returned
those caught in the fishery, were produced in 1979
Survival in the marine environment, excluding jack
twice as high for the 1978-79 (6.5%) marine rearing p
(3 3%) period. One possible factor contributing to th
may have been the larger size of the 1978 smolts. Th
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ver channel and its tributaries is controlled by the valley te
ructure and the modifying effects of large woody debris. Large woody d
important to all habitats regardless of size of stream. Without large
awning and rearing-habitat quality would be poorer, even in the l
diment-rich main channel. Large wood-capped side channels had eight
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responses of juvenile brook trout, *Salvelinus fon*
exposing separate groups of 20 test individuals to
7.4) or decarbonated acidic waters at varying pH le
Fish behavior during the 96-h test period was rec
placed above a two chambered artifical stream appara
over cumulative 24-h periods (1-24, 25-48, 49-72,
entire test period (96 h). Significant avoidance (p
not occur until fish had a choice of neutral water
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ut spawning areas in four tributaries to the North Fork of the Fla
er. Montana demonstrated that spawning areas in one of the tribut
al Creek) contained significantly higher percentages of fine sedimen
other three tributaries Bull trout embryo survival and subseque
rgence success was highly correlated ($r^2$=0 87) to the percenta
erial less than 6 4 mm within the streambed of Coal Creek A signi
relation ($r^2$=0.40, p<0 001) was found between substrate score and dens
juvenile bull trout (fish longer than 75 mm) in 26 Swan River trib
ches. Increase in estimated sediment loads attributed to road develo
pressed as percentage over natural) was significantly correlated (p<0
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corpare population biomasses in western Washington streams f
old-growth forests with those in areas recently clearcut In pa
unlogged sites, total salmonid biomasses averaged 1 5 times
logging than in adjacent unlogged sections Among all site
unpaired locations), total salmonid biomasses were 2 0 time
average, in clearcuttings Streams in logged watersheds co
percentages of age-0+ steelhead and age-0+ cutthroat tro
percentages of age-0+ coho salmon and age-1+ and -2+ cutthroa
streams in old-growth forests Shifts in species and age co
related to habitat changes that resulted from timber harvest
removal from the channels Large, stable organic debris decline
debris increased after passage of forest practices legislatio
immediate debris removal following logging Pool volumes decre
volumes increased after streambank disturbances and chan
although the frequency (number per km) of both pools and riffl
streams flowing through clearcut sites. Riffles in streams
extensive debris removal were elongated and in many cases ex
former pool locations Increases in the proportional
underyearling steelhead and cutthroat trout after clearcutti
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S. D. Dep. Game Fish Parks, Rapid City] A flood prevention project comp
1978 severely altered an 8.25 yds. portion of Rapid Creek to a sl
nnel, 32 yds. wide, in Rapid City, South Dakota. Subsequent agreemen
U.S. Army Corps of Engineers resulted in a stream rehabilitation p
h used wing deflectors and rip-rap to restore the channel to a meande
wide channel. Fish population response was monitored annually
ter finishing work. Brown trout (*Salmo trutta*) numbers increased 461%,
bers of mountain suckers (*Catostomus platyrhynchus*) and white sucke
*commersoni*) decreased 86% and 95%, respectively from 1978 to 1983.

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URAL AND LOGGING-RELATED WINTER STREAM TEMPERATURE CHANGES ON THE
E HISTORY OF COHO SALMON (*ONCORHYNCHUS KISUTCH*) IN CARNATION CREEK, B
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dlife Relationships in Old-Growth Forests. (Am. Inst. Fish. Res. Bio
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86-005390 CONTINUED Reintjes, Rt. 4, Box 85, Morehead City, NC 2
[Pac Biol Stn., Nanaimo, BC V9R 5K6, Canada] Carnation Cr
rain-forest stream located on Barkly Sound, Vancouver Is
Columbia It is the site of a 15-year watershed study concerned w
of logging on anadromous and resident salmonids. This paper dea
the effects of natural and logging-induced stream temperatu
winter on juvenile coho salmon Extensive logging began in the
77 and continued until 1980-81, by which time 41% of the wate
clearcut. Stream temperatures in early winter from 1976-77 t
were higher than they had been prior to logging. Temperat
resulted from climatic amelioration, which began in 1976, and f
of logging As a result of higher temperatures, coho salmon fry e
in the spring than they had prior to logging. Early emergent fi
move downstream during spring freshets began growing sooner. In
of highest winter temperatures, fry emerged 47 days earlie
prelogging years and this, coupled with faster growth in late
the fish entering their first winter at a larger size. Conseque
through the winter was greater, leading to increased numbers and
smolts and an increased proportion of 1-year versus 2-year
speculation is offered about processes that have affected strea
during winter.

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J. W. Reintjes, Rt. 4. Box 85, Morehead City, NC 28557. FR 31(4)
[Quinault Dep. Nat. Resour., Taholah, WA 98587] Excessive cle
residues along small streams can deplete the stream enviro
stabilized organic debris. An experiment was conducted to deter

005396 CONTINUED the effects on a resident salmonid populatic
rcleaning a stream course of organic debris. The study was conducted
lwater streams of the Clearwater River in Washington during 1972 and
ıring of the stream had little or no effect on numbers and bioma
throat (*Salmo clarki clarki*) immediately after alteration and pri
ter. Subsequently, population reductions occurred in the treated s
winter 1972-1973, but these losses were short-term. The decli
ers of overwintering trout was apparently associated with ha
ability brought on by the removal of large organic debris from the s
nel Within 1 year of debris removal, the cutthroat trout populatic
rned to pretreatment levels. Also the physical habitat characteristi
altered stream were largely restored to pretreatment conditions wit
of debris removal. If there had not been a source of debris to replace
h was removed, habitat and fish recovery may have been slower.

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00 From J. W Reintjes, Rt. 4, Box 85, Morehead City, NC 28557. FR 31(4
ox 1024, Lanai, HI 96763] Evapotranspiraton of rapidly growing forest
edly reduce the minimum streamflows during the summer. In many strea
heast Alaska, the minimum summer streamflows limit spawning succe
and chum salmon and may limit the habitat of species such as coho s
rear in streams. Extrapolating from the literature leads to
lusion that converting significant portions of old-growth watersh
dly growing second-growth forest risks permanently reducing summe
s of the streams and, thus their ability to produce salmon.
mmended that this risk be considered in managing the forests and
cts on streamflow of converting old-growth forests to second-g
sts be included in studies of logging in southeast Alaska.

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THE RESULTS OF A LONG-TERM STUDY OF FIVE STREAMS IN
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Morehead City, NC 28557. Abstract only. FR 31(4)
[ITT Rayonier Inc., Shelton, WA] Effects of logging
five small watersheds on the Olympic Peninsula were st
Studies were designated to represent current loggin
growth forest. Areas were harvested under the requireme
practices" within the guidelines of Washington Stat
Sampling was conducted during summer low streamflo
September. Each area was studied for a minimum of t
three summers after logging. Uncut areas located
throughout the study. The study was designed prima
investigation. Physical parameters studied included
gravel and characteristics of stream temperature. Str
were monitored to support other parameters. Chemical m

005410 CONTINUED included dissolved oxygen (DO), subgravel diss
gen, conductivity, color, pH, and turbidity. Biological monit
uded riffle benthos and fish populations. Although analyses of dat
inuing, *the following findings are indicated*· 1. *Effects on*
lations are not apparent Where fish biomass or composition changes c
llel changes are seen in upstream controls. 2. There is an overall
increased biomass of riffle benthos 3. Composition of riffle benth
rally unchanged, but further analyses are required. 4. Effects on f
3mm) in spawning gravel varied. Small increases measured in one strea
considered to be of a magnitude that should affect fish productio
, absolute maximum, and diurnal fluctuations of water temper
eased after logging and will probably persist for several years. 6.
gest that other water parameters (including subgravel DO) have not gi
ged 7. Logging that is properly conducted and supervised withi
straints of present environmental guidelines is compatible with fish
luction in small headwater streams in western Washington

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*Fish Soc.* 115(4) 555-567. 1986. FR 31(4)
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TREAMBED GRAVELS IN SOME PINK SALMON SPAWNING STREAMS IN ALASKA. *IN*
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. Available @ $20 00 from J. W. Reintjes, Rt. 4, Box 85, Morehead Cit
7 FR 31(4)
Box 368, Juneau, AK 99802] Composition of gravel was measured in sel
salmon spawning riffles in several streams in southeast Alaska
*am in Prince William Sound, during the period 1963-1971 Over*
ambed samples were analyzed for fine particulate matter The
urement, percent <0.83 mm in diameter, was used throughout. There was
ement between percent <0.83 and the "fredle index," and between resul
yzing gravel samples by the volumetric (wet) method and gravimetric
od. The mean percent particle size <0.83 mm for 18 streams was
ration of streams in logged watersheds from those in unlogged water
lted in means of 9.1 percent for streams in logged drainages an
ent for streams in unlogged watersheds, but tests with a nested Ananys
ance showed no significant difference in percent fines <0.83 betwee
ams in logged watersheds and six streams in unlogged watersheds Te
erences between sediment levels sampled during different seasons a
ificant differences in some cases, and none in others.

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[USDA For. Serv., Rocky Mtn. For. Range Exp. Stn , Fort

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REGULATIONS

86-005442 Barnhart, G. A and R. Engstrom-Heg. A SYNO
EXPERIENCES WITH CATCH AND RELEASE MANAGEMENT OF
*Richardson, F and R. H Hamre (Tech. eds.). Wild Trout*
FR 31(4)
[N.Y State Dep Environ. Conserv., Albany] Catch and
are an effective tool for accomplishing a variety of wil
objectives in New York. Absolute or partial harvest re
successfully employed to: 1) increase angler catch
rainbow and lake trout; 2) reduce need for stocking to
stream brown trout and lake trout fisheries; 3) restore
trout, rainbow and lake trout populations; and 4) i
increase the maximum size, abundance and catch rate o
Attainment of these objectives has typically been at a co
but size limit protection has frequently produce
Implementation of catch and release regulations has ty
term depression in angler use followed by partial or com
several years Neither lack of angler compliance nor h
precluded attainment of catch and release objectives.
impacts of harvest restrictions have frequently been di
Evaluation schemes for catch and release management pr
several years of post-implementation monitoring.

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ulations for brown trout were changed from a 12-inch minimum to a sl
e limit. The slotted limit allowed harvest of trout between 8 and 12 i
over 16 inches. Abundance of brown trout smaller than 8 inches decrea
abundance of 8- to 12-inch brown trout decreased by 32%, and abundar
wn trout over 12 inches decreased by 47%. Growth rate did not c
nificantly Annual fishing mortality rate between ages 2 and 3 inci
n near zero to about 30%, and this reduced the number of fish survivi
er ages and larger sizes However, unfavorable changes in environm
ditions contributed to decreases in abundance also Total numerical ha
brown trout increased nearly five times but consisted of smaller
hing pressure probably increased somewhat, but the increase in harve
primarily to the change in size limits. Voluntary release of legal-
ut appeared to increase independent of our regulations. We conclude
greatest effect of the slotted limit was in reshaping man's use o
ut populations Biological effects were comparatively unimportant,
their influence on satisfying desires of different factions withi
ling community.

005445 Combs, D L. THE ROLE OF REGULATIONS IN MANAGING PADDI
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ilable at $9.00 ($11.00 Foreign) from Joe G. Dillard, 1110 College
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U S Army Corps Eng., P.O. Box 619, Tulsa, OK 74121]

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[USDA For. Serv., Juneau, AK] Because land management may affect a
system at various points along its progression to the sea, it is import
identify zones used in the watershed by juvenile salmonids. This 2-year
examined the distribution of juvenile salmonids in an undisturbed,

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etermine the distribution of juvenile salmonids in a small stream
the main stream through the upper tributaries. Differences in der
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utary zones, and upper tributary zones were observed. Upper reach
utaries were used by age-0 coho, cutthroat trout, and Dolly Varden.
hes of tributaries were extensively used by juvenile coho of all
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treams and rivers of all sizes. Streams associated with old-growth fo
dominated by large tree-sized woody debris. Large woody debris
ment and creates a great diversity of habitat for both fish and aq
rtebrates Woody debris slows the routing of finer organic matter
ws organisms time to more fully process these materials before the
d downstream The structural influences of woody debris differ l
een streams flowing through old-growth and through natural, young,
fire stands Large logs may reside in a channel for a century, or more
ide a variety of benefits to the aquatic ecosystem until the post-wil
d matures to the point of contributing large debris to the channel
ed States has few remaining examples of the full, natural interacti
rs with adjacent forests except in Alaska and national parks. Undist
ams in old-growth forests are restricted to small, high-gradient exa
elatively inaccessible and mountainous areas A rich archival r
ments man-imposed changes in forest influences on rivers in a varie
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USSR: Southern Primorye
86-001585

USSR: Tyumen
86-004931
86-004934
86-004935

USSR: Ural River
86-001760

USSR. Ust'Ilimskoe Reserv
86-000540

USSR: Volga Delta
86-002684

USSR: Volga River
86-001757
86-001759
86-001968

USSR: White Sea
86-004480

Utah
86-004129

Utah: Bear Lake
86-004549

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86-002239
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86 001493
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86 002343
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86 003120
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86-002239
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86-002239
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86 004545
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86 004094
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86 004442
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86 002554
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86-002554
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86 002249
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86 000774
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86 002919
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86 003724
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86 000477
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86 003724
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86 002818
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86 003500
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86 000419
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86 000419

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86-000483
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86-001000
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86-001374
86-003755
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86-004176
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86-004424
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86-005232
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86-001548
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86-001453
86-005249
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86-000356
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86-000356
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86-004182
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86-005232
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86-002580
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86-005191
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86-005191
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86-005191
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- Spawning
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- Dentition
  - 86-001385
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  - 86-005090
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  - 86-004145
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  - 86-004529
  - 86-004560
  - 86-004619
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  - 86-001375
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  - 86-004803
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  - 86-003770
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  - 86-005090
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  - 86-001375
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  - 86-004874
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  - 86-000032
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  - 86-000032
  - 86-003438
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Cirrhina mrigala
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  - 86-005279
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  - 86-005279
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  - 86-000047

Cirrhina reba
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  - 86-001110

Clarias angulularis
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Clarias batrachus
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Clarias batrachus
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  - 86-002520
- Organochlorines
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- Blood Chemistry
  - 86-002524
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  - 86-001317
  - 86-003430
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  - 86-002511
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  - 86-003900
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  - 86-001418
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  - 86-004345
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  - 86-003395
  - 86-003409
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  - 86-004521
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  - 86-001769
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  - 86-005479
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  - 86-005060
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  - 86-003391
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  - 86-004345
  - 86-004364
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  - 86-004546
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  - 86-003957
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  - 86-004450
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  - 86-004296
  - 86-004555
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  - 86-000015
  - 86-003245
  - 86-004555
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  - 86-004450
  - 86-004451
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  - 86-000496
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  - 86-004555
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  - 86-003245
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  - 86-004277
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  - 86-001264
- Larval Drift
  - 86-004462
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  - 86-004257
  - 86-004296
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  - 86-004296
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  - 86-004257
- Management/Research--Mari
  - 86-001264
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  - 86-000157
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  - 86-004246
  - 86-004257
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  - 86-000015
  - 86-003245
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  - 86-000015
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  - 86-004451
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  - 86-003742
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86-004500
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86-000019
86-002057
86-003402
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86-000019
86-000074

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86-004496
86-004507
86-004545
86-004574
86-005484
86-005640
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86-004244
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86-005483
86-005484

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86-001444
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86-000088
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86-002678
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  - 86-000636
  - 86-001162
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  - 86-005322
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  - 86-002162
  - 86-003548
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  - 86-003025
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  - 86-002978
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[illegible]

Ictalurus punctatus

- Selective Breeding
  - [illegible]
  - [illegible]
- Sex Reversal
  - [illegible]
- Skeletal System
  - [illegible]
- Solids
  - [illegible]
- Specific Dynamic Action
  - [illegible]
- Stress
  - [illegible]
  - [illegible]
- Taste and Odor Problems
  - [illegible]
  - [illegible]
- Tolerance
  - [illegible]
  - [illegible]
- Temperature
  - [illegible]
  - [illegible]
  - [illegible]
- Thermal Shock
  - [illegible]
- Trace Metals
  - [illegible]
- Transportation
  - [illegible]
- Triploid Fish
  - [illegible]
- Vibrio
  - [illegible]
- Vibrio anguillarum
  - [illegible]
- Viral Diseases
  - [illegible]
  - [illegible]
  - [illegible]
- Vision
  - [illegible]
  - [illegible]
  - [illegible]
- Water Quality
  - [illegible]

Ictiobus

- Culture/Propagation
  - [illegible]

Illinois reservoirs

- Microbiological Composition
  - [illegible]

Illyogobius sp.

- Distribution/Vertical
  - 86-001590
- Fish Lists/Keys
  - 86-001590
- Identification
  - 86-001590
- Life History/General
  - 86-001590

Illyogobius bicornis

- Distribution/Vertical
  - 86-001590
- Fish Lists/Keys
  - 86-001590
- Identification
  - 86-001590
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Inactinobacillus platmoris

- Bioamplification
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86-000750
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86-005041
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Liza macrolepis
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86-002105
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Liza richardsoni
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Liza saliens
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86-002261
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Oncorhynchus keta
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  - 86-003397
  - 86-003398
- Diets
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  - 86-002294
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  - 86-004090
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  - 86-002967
- Induced Maturation
  - 86-002062
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  - 86-004038
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  - 86-001490
  - 86-004115
  - 86-004418
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  - 86-000585
  - 86-000650
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  - 86-001951
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Oncorhynchus kisutch
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  - 86-004766
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  - 86-005065
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- Chemoreception
  - 86-001570
  - 86-002564
  - 86-004001
- Clearcutting
  - 86-005378
  - 86-005401
- Congenital Fishing
  - 86-000658
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  - 86-004165
  - 86-004178
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- Corticosteroids
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  - 86-004001
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  - 86-002052
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  - 86-000941
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- Urban Development
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- Culture/Propagation
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- Diphyllobothrium latum
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- Fertilization
  - 86-003408
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